

July 7, 1964

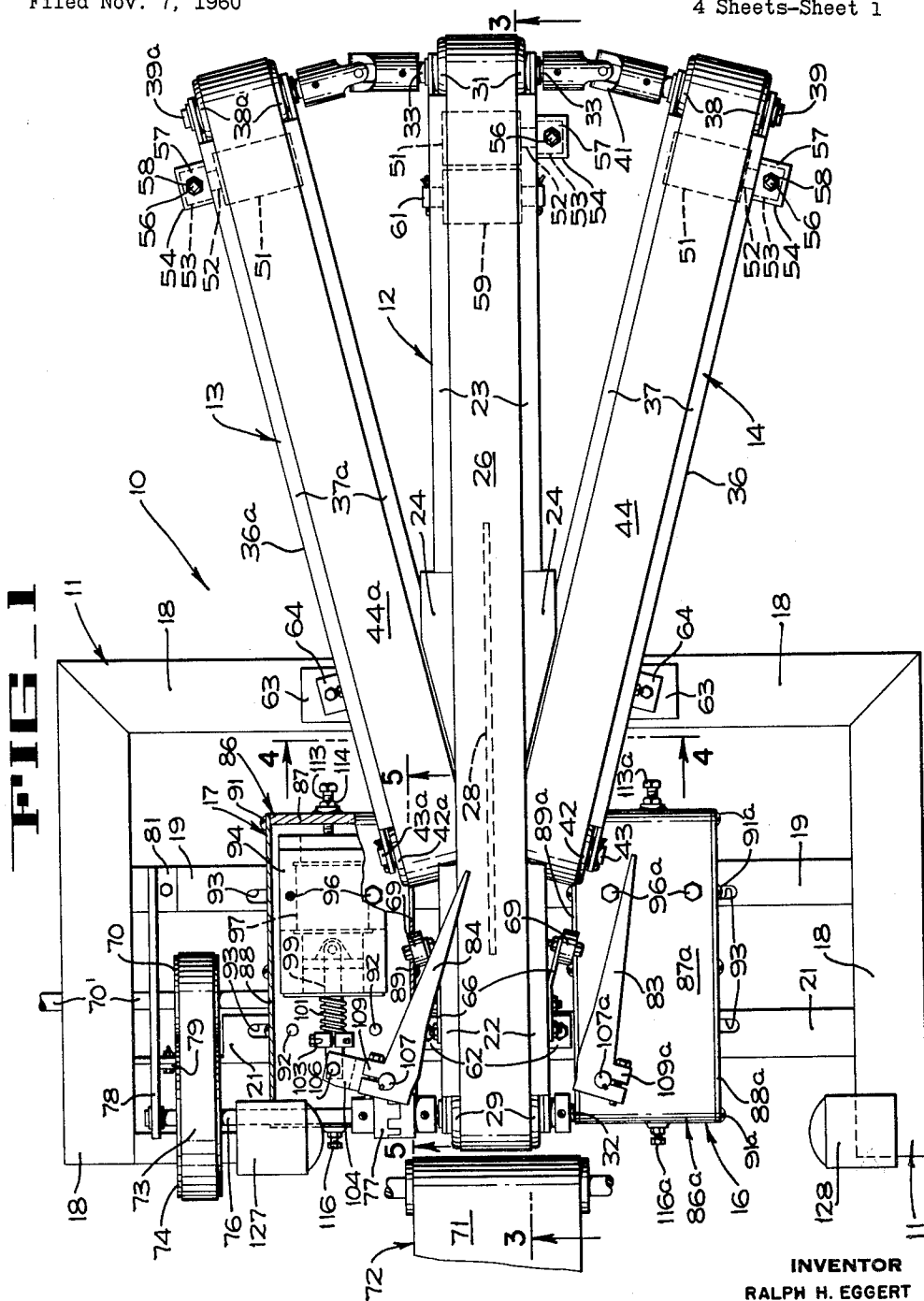
R. H. EGGERT

3,139,965

HIGH SPEED SORTING APPARATUS

Filed Nov. 7, 1960

4 Sheets-Sheet 1



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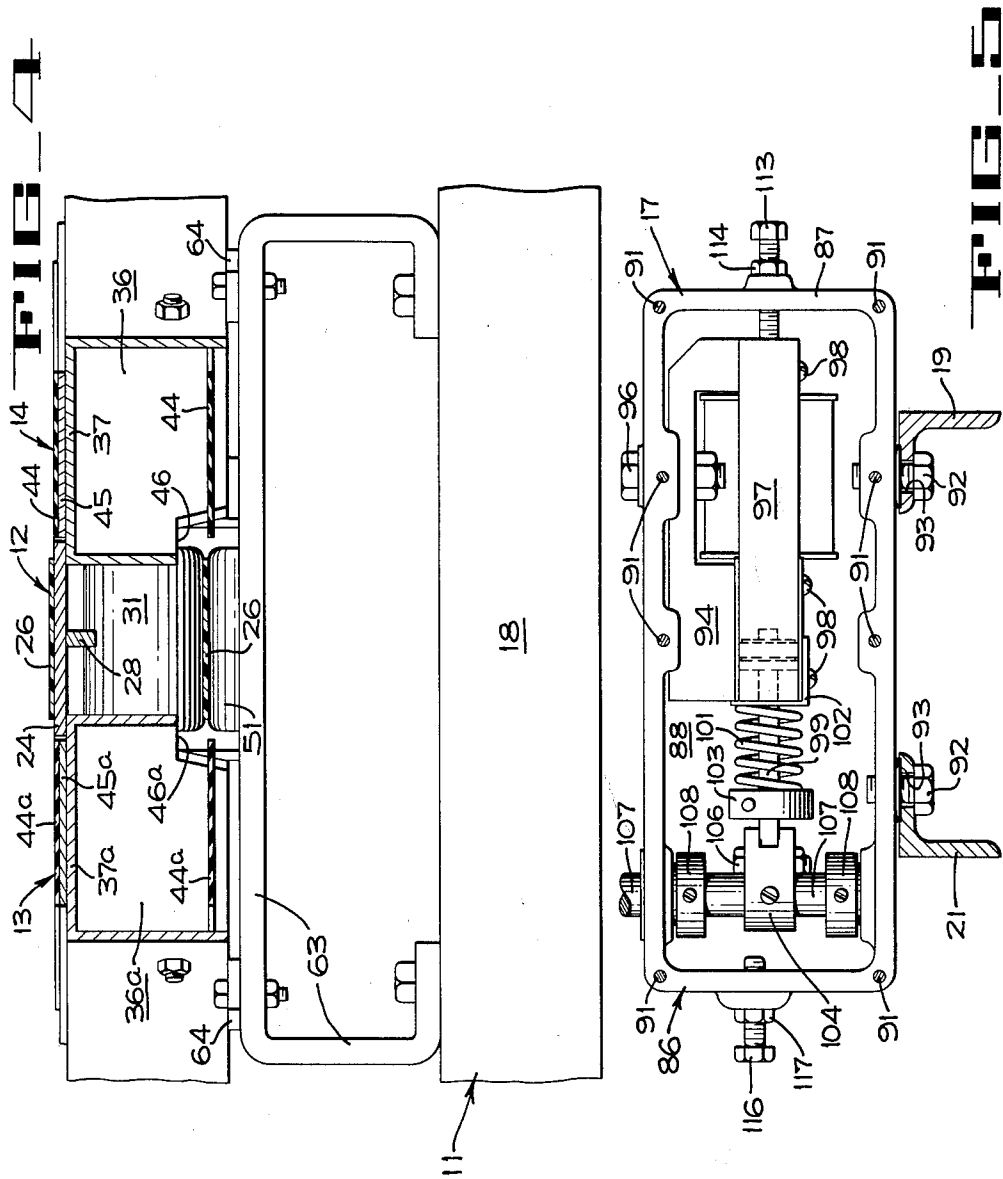
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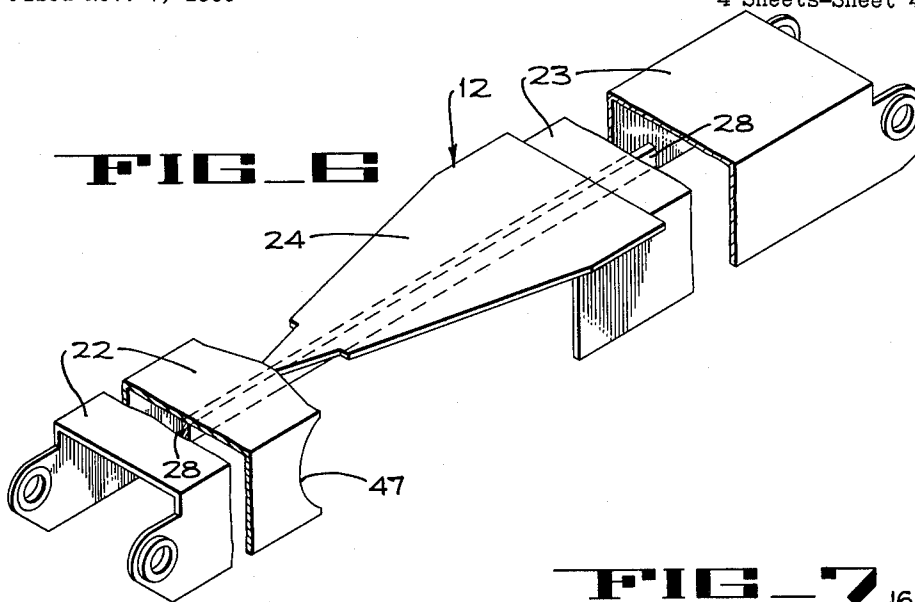
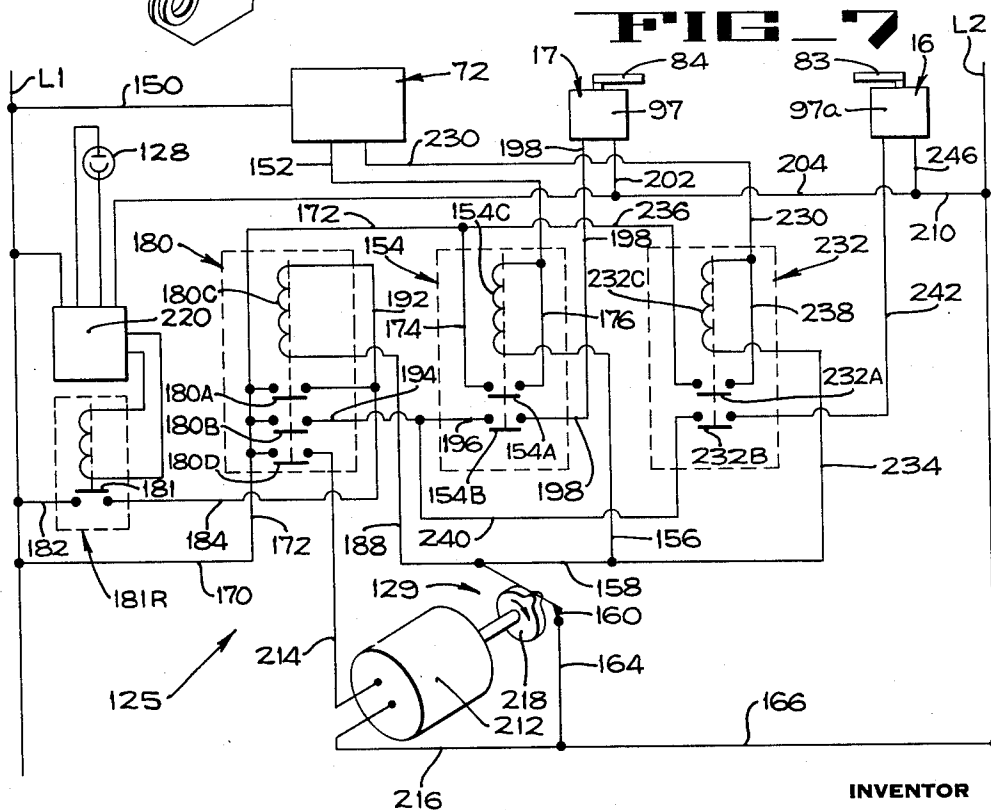
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HIGH SPEED SORTING APPARATUS

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9 Claims. (Cl. 198—31)

The present invention pertains to high speed sorting apparatus, and more particularly relates to a high speed article reject mechanism for sorting apparatus.

Presently known check weighers are capable of weighing articles at a rate of 400 articles per minute into three weight categories; underweight, proper weight, and overweight. These check weighers are arranged to transmit electrical signals when articles are either underweight or overweight and these signals are used to actuate an article rejecting mechanism to deflect the underweight and overweight articles from the path of movement of the articles of proper weight. It will be recognized that the article rejecting mechanism must operate very rapidly when handling articles at the rate of 400 articles per minute and that the rejected articles may be injured by the rejecting mechanism unless the mechanism is properly controlled and is moved into deflecting position before the article reaches this position. In addition, the fixed minimum distance between the articles, as determined by the time taken to deflect one article, should be reduced to as low a value as possible so that the conveyor speeds will not be excessive when handling articles at the high rate mentioned.

It is, therefore, one object of the present invention to provide an improved high speed article sorting apparatus.

Another object is to provide a high speed article rejecting mechanism arranged to gently handle articles.

Another object is to provide a high speed article rejecting mechanism which is readily adjustable to handle articles of different size.

Another object is to provide a high speed article rejecting mechanism which is readily adjustable to handle articles traveling at different speeds.

Another object of the present invention is to provide a high speed article sorting mechanism which will deflect an article in a minimum amount of time so that it may handle a maximum number of articles during a given period of time.

These and other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, in which:

FIG. 1 is a plan of the apparatus of the present invention certain parts being cut away.

FIG. 2 is an elevation of the apparatus of FIG. 1.

FIG. 3 is a vertical section taken along lines 3—3 of FIG. 1, certain parts being removed.

FIG. 4 is an enlarged vertical section taken along lines 4—4 of FIG. 1.

FIG. 5 is an enlarged section taken along lines 5—5 of FIG. 1.

FIG. 6 is a fragmentary perspective of the main conveyor frame.

FIG. 7 is a diagram of the control circuits for the sorting apparatus of FIG. 1.

The high speed sorting apparatus 10 (FIGS. 1 and 2) of the present invention comprises a main frame 11 which supports a main conveyor 12 for conveying articles of proper weight, a diverting conveyor 13 angled in one direction outwardly from said main conveyor 12 to receive and move overweight articles away from the main conveyor 12, and a diverting conveyor 14 angled in the other direction outwardly from the main conveyor 12 and arranged to receive and move all underweight articles away from the main conveyor 12. An overweight article

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rejecting mechanism 16 and an underweight article rejecting mechanism 17 are supported by the frame 11 and are arranged to deflect overweight and underweight articles, respectively, from the main conveyor 12 onto the overweight conveyor 13 and underweight conveyor 14, respectively.

The main frame 11 may be supported at any suitable height by legs (not shown) and includes a U-shaped member 18 (FIG. 1) having laterally extending angle members 19 and 21 (FIG. 3) rigid therewith. The main conveyor 12 comprises a forward conveyor support member 22 (FIGS. 3 and 6) and a rear conveyor support member 23 both of channel shaped configuration. The members 22 and 23 are aligned and are connected together by a generally triangular plate 24 which is in planar alignment with the upper surface of the support members 22 and 23 to provide a flat surface along which the upper run of main conveyor belt 26 rides. The forward edge of the plate 24 abuts and is welded to the rear end of the support member 22. A stiffening rib 28 is welded to the under surfaces of the triangle plate 24 and to the support members 22 and 23 to provide a rigid support for the main conveyor belt 26. The belt 26 is a smooth surfaced plastic belt having a low coefficient of friction and is trained around a drive roller 29 (FIGS. 1 and 3) and a driven roller 31. The drive roller is secured on a shaft 32 which is journaled in the forward end of the support member 22, and the driven roller 31 is secured to a shaft 33 which is journaled in the rear end of the support member 23.

The underweight conveyor 14 includes a channel-shaped support member 36 (FIGS. 1 and 4) having an upper surface 37 which is partially disposed below the triangle plate 24 and is connected thereto in any suitable way, such as by welding. A drive roller 38 (FIG. 2) is secured to a shaft 39 which is journaled in the discharge end of the frame member 36 and is connected to the shaft 33 by a universal joint 41 (FIG. 1). A driven roller 42 is secured to a shaft 43 which is journaled in the forward end of the support member 36. A rubber coated belt 44 having a relatively high coefficient of friction is trained around the rollers 38 and 42 and is disposed below and in contact with the main conveyor belt 26 in the area adjacent the driven roller 42. Since the support member 36 is secured against the under surface of the triangle plate 24, and since the triangle plate is thicker than the belt 44, a spacer 45 (FIG. 4) is disposed between the belt 44 and the upper surface of the support member 36 to bring the level of the belt 44 to a level which is slightly below the level of the lower surface of the upper run of the main belt 26. It will be noted that the support member 36 is cut away at 46 to provide running clearance for the lower run of the main conveyor belt 26. The driven roller 42 and a portion of the belt 44 curved therearound is received in an arcuate recess 47 (FIG. 6) in the forward conveyor support member 22.

The parts for supporting and driving the overweight conveyor 13 are substantially the same as the parts of the above-described underweight conveyor 14. Therefore, those parts of the conveyor 13 which are equivalent to parts of the conveyor 14 will not be described in detail and will be assigned the same numeral followed by the suffix "a."

The conveyors 12, 13 and 14 are each provided with a takeup roller 51 which engages the undersurface of the lower run of the belt and is journaled on a shaft 52 that is secured to a block 53. Each block 53 is slidably received in a U-shaped guide bracket 54 (FIG. 1) and is provided with screw threads for receiving a takeup bolt 56. Each takeup bolt 56 extends through an opening in a plate 57 welded to the upper end of its associated bracket 54 which is, in turn, welded to the frame member

of its associated conveyor 12, 13 or 14. Adjustment nuts 58 on the takeup bolts 56 are provided to raise or lower the rollers 51 to provide the proper belt tension. The main conveyor 12 is also provided with an idle roller 59 (FIG. 3) which is disposed adjacent to but forwardly of the takeup roller 51. The roller 59 provides means for more effectively tightening the main conveyor belt 26 which transmits power to the other conveyors 13 and 14. The roller 59 is journaled on a shaft 61 which is received in openings in the frame member 23 and is held in place by cotter keys or the like.

As has already been mentioned, the rear support member 23 of conveyor 12 is secured to both support members 36 and 36a, and the support members 23, 36 and 36a are all secured to the triangle plate 24 as by welding. This arrangement provides a sturdy conveyor frame assembly which is supported from the main frame 11 by forward upstanding legs 62 (FIGS. 1 and 3) which are bolted to the angle member 21, and by a rear upstanding bracket 63 (FIG. 4) which is bolted to the U-shaped member 18. Angle clips 64 are bolted to the U-shaped support members 36 and 36a and to the bracket 63. The legs 62 (FIG. 1) and a pair of roller support arms 66 are connected to the forward conveyor support member 22 by bolts. Each roller support arm 66 is bent outwardly from the associated side of the support member 22 and has a roller 69, journaled thereon. The rollers 69 are arranged to partially support articles as they are being transferred from the main conveyor 12 to either the overweight conveyor 13 or underweight conveyor 14 by the overweight or underweight article rejecting mechanism 16 and 17, respectively.

The conveyors 12, 13 and 14 are driven at the same speed as the discharge conveyor 71 of a check weighing machine 72 by a V-belt 73 which is trained around a drive pulley 70 (FIG. 1) and around a pulley 74 on a shaft 76. The pulley 70 is keyed to a shaft 70' which is journaled in the frame 11 and is driven by any suitable means (not shown). The shaft 76 is connected at one end to the shaft 32 by a coupling 77 and is journaled adjacent its other end in an upstanding bracket 78 (FIGS. 1 and 3) which has a laterally extending gusset plate 79 bolted to the angle member 21 and a foot 81 bolted to the angle member 19. The check weighing machine 72 is of the type disclosed in the application of John A. Abbott et al., Serial No. 789,124 which is assigned to the assignee of the present invention.

The article rejecting mechanisms 16 and 17 are identical except that they are arranged to activate their respective deflecting arms 83 and 84 in opposite directions. Therefore, only the underweight article rejecting mechanism 17 will be described in detail and the same numerals followed by the suffix "a" will be assigned to equivalent parts of the mechanism 16.

The mechanism 17 comprises a housing 86 (FIG. 5) formed as a rectangular body 87 having side plates 88 and 89 (FIG. 1) connected thereto by screws 91. The housing 86 is connected to the angle members 19 and 21 by cap screws 92 which extend through transversely extending slots 93 in the members 19 and 21 and which permit the mechanism 17 to be easily adjusted to handle articles of different widths. Within the housing 86 is a solenoid supporting bracket 94 which is connected to the housing 86 by bolts 96 and has a solenoid 97 connected thereto by cap screws 98. The actuating element 99 of the solenoid 97 is urged outwardly by a spring 101 which is disposed between an end plate 102 (FIG. 5) bolted to the solenoid 97 and a collar 103 clamped on the actuating element 99. A yoke 104 is pivotally connected to the actuating element 99 by a bolt 106 and is keyed to a vertically extending shaft 107 which is journaled in the housing 86 and is held from axial movement by set collars 108 fixed by set screws to the shaft 107.

The deflecting arm 84 (FIG. 1) is secured to the upper end of the shaft 107 by a split block 109 which is rigidly

secured to the shaft by a cap screw and a key. A set screw 113, screwed into one end of the housing 86, bears against and aids in holding the solenoid 97 from movement. The set screw 113 is locked in place by a jam nut 119. A similar set screw 116 is screwed into the other end of the housing 86 and is locked in place by a jam nut 117. The set screw 116 contacts the yoke 104 (FIG. 5) when the solenoid 97 is in its deenergized position thereby serving as means to adjust the position of the deflecting arm 84 when the arm is in its retracted or non-deflecting position.

In order to deflect articles from the main conveyor 12 onto either the overweight conveyor 13 or the underweight conveyor 14 without injury to the article, it is desirable that the deflecting arm 83 or 84 be in the article deflecting position before the article reaches the deflecting position. The deflecting arm must be held in deflecting position for a sufficient period to deflect the article and must be moved out of the deflecting position before the next article is moved into this position. Since the articles travel at the very rapid rate of approximately 400 articles per minute, and since the signals which are sent to the solenoids 97 and 97a (FIG. 7) when articles are overweight or underweight come from the check weigher at a position spaced from the deflecting station, it is apparent that very close control must be maintained over the energization and deenergization of these solenoids.

Many different types of control circuits may be used for controlling the actuation of the solenoids 97 and 97a. In FIGURE 7, a typical control circuit 125 is shown for controlling the actuation of the solenoids 97.

Briefly, the selective energization of the solenoids 97 and 97a is controlled by the joint action of an overweight or underweight signal from the check-weighing machine 72, by breaking the beam from a light source 127 (FIG. 1) to a photocell 128 by the article to be deflected, and by a timer mechanism 129 (FIG. 7). The light source 127 and photocell 128 are disposed on opposite sides of the main conveyor 12 immediately forward of the deflecting arms 83 and 84 and in position wherein the beam is intercepted by the articles. The interception of the beam by underweight or overweight articles causes the energization of the solenoid 97 or 97a, and the timer mechanism 129 determines the duration of energization of these solenoids to assure proper deflection of the article. Since the coefficients of friction of the surfaces of the diverting belts 44 and 44a are considerably larger than that of the surface of the main conveyor belt 26, the articles which are diverted will be gripped by the diverting belts when they are only partially supported thereon and will be pulled directly off the main conveyor belt without any substantial twisting force being imposed upon the article due to the friction between the surface of the article and the surface of the main conveyor belt. The period of time necessary to assure proper deflection of the article is, therefore, that period of time which it takes to turn the article in the direction of the diverting conveyor and change the direction of its momentum and to place the article in a location whereby it is partially supported by the diverting conveyor. When this condition has been obtained, the deflector member may be deenergized and moved back to its non-deflecting position so that it may be made responsive to the particular characteristics of the following article and thereby determine whether that article will be deflected or not.

The check weighing machine 72 has incorporated therein a weight classifier which is adapted to close one circuit if the article is underweight and another circuit if the article is overweight. If the article is underweight a circuit is closed from the power line L1 (FIG. 7), through lead 150, lead 152, coil 154C of relay 154, leads 156, 158, contacts 160 of the timer unit 129, leads 164 and 166 to power line L2. This circuit energizes the normally open relay 154 to close contacts 154A and 154B. A holding circuit for relay 154 comprises line L1, leads

170, 172, 174, contacts 154A, lead 176, coil 154C, leads 156, 158, timer contacts 160, leads 164 and 166 to line L2. This holding circuit retains the relay 154 energized after the original energizing circuit is broken. The energizing of the relay 154 preconditions a circuit to energize the solenoid 97 of the underweight rejecting mechanism 17 upon energization of the relay 180. The relay 180 is energized through a circuit including photocell controlled relay switch 181 which circuit is closed as follows: from line L1, through lead 182, relay switch 181, lead 184, the coil 180C of relay 180, lead 188, timer contacts 160, leads 164 and 166 to line L2. When the relay 180 is energized by the closing of the relay switch 181, the relay 180 will remain energized through a holding circuit as follows: from line L1 through lead 170, lead 172, contacts 180A, lead 192, coil 180C, lead 188, timer contacts 160, and leads 164 and 166 to line L2.

When relay 180 is energized, it completes the preconditioned circuit to the solenoid 97 as follows: from line L1, through leads 170, 172, relay contacts 180B, leads 194 and 196, relay contacts 154B, lead 198, solenoid 97, and leads 202, 204, and 210 to line L2. Energizing the relay 180 also closes the circuit to the timer motor 212 as follows: from line L1 through leads 170, 172, contacts 180D, lead 214, motor 212, and leads 216, 166 to line L2. When the motor 212 has caused one revolution of the cam 218 connected thereto, the cam causes the points 160 to break momentarily to open the holding circuits to the relays 154 and 180 thus restoring the circuits to their neutral positions ready to be actuated in accordance with the characteristics of the succeeding articles. It will be appreciated that the time necessary for one revolution of the cam 218 should be as short as possible so that the next succeeding article may be brought through the deflecting station and either deflected or not deflected as soon as possible.

The mechanism controlling the triggering of the memory unit, or in other words, the energization of the relay 180, comprises the photocell controlled relay switch 181. The relay switch 181 comprises the contacts of a closed relay 181R which is normally energized and held open by an amplifier 220 with which the photocell 128 is associated. When the light beam to the cell 128 is broken, and the cell no longer conducts current, the output from the amplifier 220 drops so that the relay 181R is no longer energized and the switch 181 then closes.

To summarize, if the article is underweight, the relay 154 is energized by a signal from the check weigher 72 to precondition the circuit that controls the solenoid 97. Then when the beam to the photocell 128 is broken, the relay 180 will be energized and the preconditioned circuit is closed to energize the solenoid 97 and the timer motor 212.

If an article is overweight, the classifier of the machine 72 closes a circuit comprising line L1, lead 150, lead 230, coil 232C of a relay 232, leads 234, 158, timer contacts 160, leads 164 and 166, and line L2. A holding circuit comprising line L1, leads 170, 172, 236, relay contacts 232A, lead 238, coil 232C, leads 234, 158, timer contacts 160, leads 164, 166 and L2 holds the relay 232 energized until completion of the cycle of the timer 129. When the relay 232 closes it preconditions the energizing circuit for the solenoid 97a as follows: from line L1, through leads 170, 172, relay contacts 180B, leads 194, 240, relay contacts 232B, lead 242, solenoid 97a, and leads 246, 210 to line L2. Then, when the relay 180 closes in response to the breaking of the light beam to the photocell 128, the preconditioned circuit is energized to energize the solenoid 97a causing the articles to be shifted from the main conveyor onto the overweight conveyor 13.

If the article is determined by the classifier 72 to be of normal weight, i.e., neither underweight nor overweight, neither of the circuits to the relays 154 nor 232 will be energized. Thus, when the relay 180 is subsequently energized both deflecting mechanisms 16 and 17

remain in the neutral or unenergized position allowing the article to pass thereby on the conveyor 12.

It can be seen from FIGURE 1, wherein the deflecting arm 84 is illustrated in its deflecting position, that the article to be diverted will, under no circumstances, remain engaged with the deflecting arm 84 during its complete transfer onto the diverting belt 44. However, since the belt 44 has a high coefficient of friction relative to the main conveyor belt 26, the article will be effectively gripped by the belt 44 and slid off the belt 26 without twisting and without the necessity for the guiding thereof by the deflecting arm 84 during the latter part of its transfer from the main conveyor. The difference in the coefficients of friction between the belts 26 and 44, therefore, frees the deflecting arm 84 earlier than would otherwise be possible and allows it to be made responsive to the next succeeding article at an earlier time.

From the foregoing description it is apparent that the high speed sorting apparatus of the present invention is simple in design and in operation and is capable of gently deflecting articles at the rate of 400 articles per minute. The article deflecting arms are actuated into deflecting position before the article to be deflected reaches the deflecting position thereby gently guiding the article across the slick surface of the main conveyor and onto the belt of the overweight or underweight conveyor which belt has a high coefficient of friction. The deflecting arm, which is in a neutral position, aids the arm which is actuated into deflecting position by cooperating with the deflected arm to provide substantially parallel guide tracks for the article to pass therebetween.

While one embodiment of the present invention has been shown and described, it will be understood that various changes and modifications may be made without departing from the spirit of the invention or the scope of the appended claims.

Having thus described the present invention and the manner in which the same is to be used, what is claimed as new and desired to be protected by Letters Patent is:

1. A high speed sorting mechanism comprising a main conveyor having an upper run defining an article carrying surface having a low coefficient of friction, an article diverting conveyor having an inlet end portion disposed closely adjacent said upper run and defining an article carrying surface having a high coefficient of friction for effectively gripping an article and diverting it off the main conveyor while it is still partially supported thereon, a deflector normally disposed out of the path of movement of articles on said main conveyor and arranged to be actuated into a deflecting position over said main conveyor and aligned generally in the direction of said diverting conveyor to deflect an article from said main conveyor onto said diverting conveyor, and control means for actuating said deflector in timed relation to the movement of articles on said main conveyor.

2. A high speed sorting mechanism comprising a main conveyor having an upper run defining an article carrying surface having a low coefficient of friction, an article diverting conveyor having an inlet end partially disposed under said upper run and defining an article carrying surface having a high coefficient of friction for effectively gripping an article and diverting it off the main conveyor while it is still partially supported thereon, a deflector at a deflecting station normally disposed out of the path of movement of articles on said main conveyor and arranged to be actuated into a deflecting position over said main conveyor and generally in alignment with said diverting conveyor prior to the arrival of the article to be diverted at said station to engage and cause said article to slide transversely from the surface of said main conveyor onto said diverting conveyor, and control means for actuating said deflector into and out of said deflecting position in timed relation with the movement of articles on said main conveyor.

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3. A high speed sorting mechanism comprising a main conveyor having an upper run defining an article carrying surface having a low coefficient of friction, an article diverting conveyor angled rearwardly away from said main conveyor and having an inlet end partially disposed under said upper run and defining an article carrying surface having a high coefficient of friction, a roller disposed forwardly of and adjacent the inlet end of said diverting conveyor and serving as an article supporting bridge between said main conveyor and said diverting conveyor, a deflector at a deflecting station normally disposed out of the path of movement of articles on said main conveyor and arranged to be actuated into a deflecting position over said main conveyor and angled generally in the direction of said diverting conveyor prior to the arrival of the article to be diverted at said station to cause said article to engage said deflector and be slid transversely from the surface of said main conveyor onto said roller and said diverting conveyor, and control means for actuating said deflector into and out of said deflecting position in timed relation with the movement of articles on said main conveyor.

4. A high speed sorting mechanism comprising a main conveyor having an upper run and an article supporting surface having a low coefficient of friction, a pair of article diverting conveyors angled away from said main conveyor and each diverting conveyor having an inlet end partially disposed under said upper run and a discharge end spaced from said main conveyor, each of said diverting conveyors having an article supporting surface with a high coefficient of friction for effectively gripping an article and diverting it off the main conveyor while it is still partially supported thereon, deflecting means normally disposed out of the path of movement of articles on said main conveyor and arranged to be actuated into one of two deflecting positions over said main conveyor and generally in alignment with said diverting conveyors to deflect an article from said main conveyor onto one of said diverting conveyors, and control means for actuating said deflecting means into and out of its two deflecting positions in response to the movement on said main conveyor of the article to be deflected.

5. A high speed sorting mechanism comprising a main conveyor having an upper run defining an article supporting surface having a low coefficient of friction, a pair of article diverting conveyors angled away from said main conveyor and each diverting conveyor having an inlet end partially disposed under said upper run and a discharge end spaced from said main conveyor, said diverting conveyors each having an article supporting surface with a high coefficient of friction, a pair of spaced deflectors being disposed at a deflecting station adjacent the inlet end of said diverting conveyors and having one deflector on each side of said main conveyor, said deflectors being normally disposed out of the path of movement of articles on said main conveyor and each deflector being arranged to be actuated independently of the other to cooperate with said other deflector to act as substantially parallel guiding surfaces to deflect an article from said main conveyor onto one of said diverting conveyors, and control means for actuating said deflector in timed relation to the movement on said main conveyor of the article to be deflected.

6. A high speed sorting mechanism comprising a main conveyor having an upper run defining an article supporting surface having a low coefficient of friction, a pair of article diverting conveyors angled away from said main conveyor and each diverting conveyor having an inlet end partially disposed under said upper run, said diverting conveyors each having an article supporting surface with a high coefficient of friction, a pair of spaced deflectors being disposed at a deflecting station adjacent the inlet end of said diverting conveyors and having one deflector on each side of said main con-

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veyor, said deflectors being normally disposed out of the path of movement of articles on said main conveyor and each deflector being arranged to be actuated independently of the other to cooperate with said other deflector to act as substantially parallel guiding surfaces to deflect an article from said main conveyor onto one of said diverting conveyors, and control means for actuating one of said deflectors into and out of deflecting position prior to the arrival at said station of the article to be deflected, said control means including a photocell disposed forwardly of said deflectors and being responsive to the movement of the article to be deflected therepast to cause actuation of one of said deflectors and including a timing device to determine the period of actuation of said deflector.

7. A high speed sorting mechanism comprising a main conveyor adapted to advance a series of articles along a straight line path, a diverting conveyor extending at an angle to said main conveyor, the conveying surfaces of said conveyors being in substantially parallel planes at substantially the same elevation with said diverting conveyor having an inlet end disposed adjacent to said main conveyor, the surface of said diverting conveyor being made of a material adapted to frictionally engage an article with a more positive gripping action than the conveying surface of said main conveyor whereby an article disposed partially on both conveyor surfaces will be pulled off the surface of said main conveyor and will thereafter be advanced along said diverting conveyor, a deflector movable from a deflecting position above said main conveyor to a retracted position spaced from said deflecting position, and control means arranged to energize and move said deflector to said deflecting position to guide an article toward said diverting conveyor and to de-energize and return said deflector to said retracted position, said control means including a timing mechanism whose cycle determines the duration of the energization of said deflector whereby said deflector may be de-energized and returned to said retracted position as soon as said diverting conveyor has effectively gripped the article and is pulling it off said main conveyor.

8. A high speed sorting mechanism comprising a conveyor of the endless belt type for moving a series of articles therealong, an article diverting conveyor of the endless belt type disposed at an angle to but in the plane of said main conveyor and having an inlet end disposed contiguously with said main conveyor, the angle at which said diverting conveyor diverges from said main conveyor being an acute angle substantially less than 90° , a deflector normally disposed out of the path of movement of the articles on said main conveyor and arranged to be actuated into a deflecting position over said main conveyor whereby it is aligned generally in the direction of said diverting conveyor to deflect a preselected article from said main conveyor onto said diverting conveyor, means responsive to the movement of said preselected article on said main conveyor for actuating said deflector into said deflecting position, said deflector being effective only until said preselected article is partially supported upon said diverting conveyor, means on said diverting conveyor for effectively gripping and positively pulling said preselected article from said main conveyor without the aid of said deflector once said preselected article is partially supported thereon whereby said deflector may be made responsive to the movement of the article following said preselected article upon said main conveyor prior to the complete removal of said preselected article from said main conveyor.

9. A high speed sorting mechanism comprising a main conveyor of the endless belt type for moving a series of articles therealong, an article diverting conveyor of the endless belt type disposed at an angle to but in the plane of said main conveyor and having an inlet end disposed contiguously with said main conveyor, the angle at which

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said diverting conveyor diverges from said main conveyor being an acute angle substantially less than 90°, a deflector normally disposed out of the path of movement of the articles on said main conveyor and arranged to be actuated into a deflecting position over said main conveyor whereby it is aligned generally in the direction of said diverting conveyor to deflect a preselected article from said main conveyor onto said diverting conveyor, means responsive to the movement of said preselected article on said main conveyor for actuating said deflector into said deflecting position prior to the arrival of said preselected article at said deflector, a pre-set timing means for determining and controlling the period of actuation of said deflector, means on said diverting conveyor for gripping said preselected article and causing it to be pulled directly in the direction of said diverting conveyor when said article is supported on both said diverting and main conveyors whereby said deflector may be deactuated

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by said timing means prior to the complete removal of said preselected article from the main conveyor so that the deflector may become responsive to the movement of the article following said preselected article on said main conveyor.

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